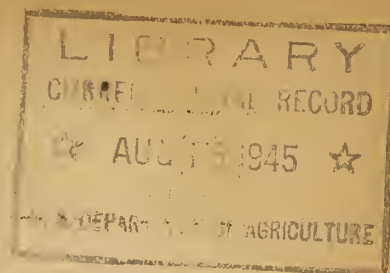


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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

MAY 1945

EROSION CONTROL PRACTICES DIVISION

Aggregation Studies - C. S. Slater of College Park, Maryland.-

"Aggregation studies have been suspended temporarily because of the lack of help caused by Mr. Bryant's illness. However, the aggregate analyses that have been run on a series of plots have been analyzed and show that:

"There is no significant difference between determinations that were made on air-dry samples when (a) the determinations were made within a week after sampling and (b) when the determinations were made after the samples had been stored from 3 to 6 months. This finding should be of some importance in cases where samples must be stored for some time before the determinations can be made.

"Aggregate analyses that were made at periodic intervals throughout the season were plotted, and indicate a trend toward better aggregation in mid-summer than in either spring or fall. However, there is considerable variation between consecutive dates and statistically the trend is of doubtful significance. It is assumed that the dryness of the period during which the runs were made tended to reduce seasonal variation.

"Highly significant differences were shown to be present between the soil types tested and between different tillage treatments on the same soil. Tillage resulted in a reduction in aggregation.

"These differences became evident because of the large number of determinations that were made on each of the plots. Aggregate analyses are not closely duplicable and differences between determinations are increased by soil variability in the field. The accuracy that can be expected of the method (see Tentative Methods for the Determination of Soil Conditions) on field samples is indicated in the following table by the standard deviations that were obtained for each size fraction.

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Runs made within -	Number of samples	Greater than 2 mm	2-1 mm	1-.5 mm	.5-.2 mm
		<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>
1 week.....	240	5.43	1.89	1.61	1.45
3 to 6 months...	240	5.51	1.72	1.49	1.50

"These data indicate that a major source of error lies in the fraction that is retained by the top sieve, and further attempts at improving the method should be directed first to lowering the variation that characterizes this separation."

Relative Humidity of Soil Air - J. C. Hide of Manhattan, Kansas.-

"Some data were collected on the relative humidity in the dry layer of the soil surface at approximately uniform temperature throughout the entire soil and air mass. It was found that the relative humidity makes a sharp break at approximately the point where the soil becomes dry and then continues to the surface in approximately a straight line. It is hoped that a method might be used to study the humidity condition under change in temperature, but the data are too variable to make this possible with the present equipment.

Nitrogen on Bromegrass.-"In cooperation with Mr. Anderson we have a number of fertilized plots on bromegrass receiving different applications of nitrogen. On areas which have received 100 pounds of nitrogen to the acre the yield has been increased from slightly over 1,000 pounds to slightly over 2-1/2 tons. A 200-pound application of nitrogen has increased yields to about 3-1/2 tons of dry hay. It appears that on this field it would be profitable to use nitrogen even for the production of hay. However, the experiment was outlined to study the effect of seed production and these data will be secured. It appears now that seed yields will be increased from practically 0 to very satisfactory seed yields. Seed yields will not be secured until early July."

Effects of Grazing on Soil Moisture - Charles J. Whitfield of Amarillo, Texas.-"Soil moisture samples taken May 2 on two native blue grama-buffalo grass pastures showed that a native pasture moderately grazed in 1944 had more moisture available than a similar pasture extremely heavily grazed in 1944. The moderately grazed pasture had 1,053 pounds per acre of residual forage or mulch for winter protection while the heavily grazed pasture had 194 pounds per acre. The moisture condition on May 2 was as follows:

Depth of sample	Per cent of moisture	
	Pasture I-1	Bush pasture
0 - 6 inches	17.3	11.0
6 - 12 inches	23.2	17.5
1 - 2 feet	18.4	13.6
2 - 3 feet	12.2	11.6
3 - 4 feet	12.2	12.9
4 - 5 feet	13.4	12.4

Subsurface Treatment Improved Upland Pasture - J. B. Pope of Tyler, Texas.-"In February 1943 an upland permanent pasture area with a Bermuda grass sod and mixture of spring clovers was strip-chiseled 12 to 15 inches deep with furrows 18 inches apart in alternating strips 25 feet wide. Seasonal clippings were made on the treated and untreated areas during the past three seasons. An increase of 27 per cent was obtained from the treated areas over the untreated areas."

Combining Oats in Texas - H. O. Hill of Temple, Texas.-"All oats were cut by the last of the month and part of them have been harvested by windrowing and then combining from the windrow. In general, direct combine harvest of oats has been an unsatisfactory procedure in this area due to the uneven ripening of the grain. This year the Station cut oats with a binder and laid them in a windrow where they were allowed to cure or dry for about three days. Then with a pickup attachment on the combine they were picked up from the windrow and threshed with the combine. This method does away with the danger of the oats heating from excess green material in the grain and saves on labor normally needed for shocking and threshing where the oats are bound and later threshed."

Favorable Progress on District Law in Massachusetts - Karol J. Kucinski.-"Very favorable progress is being made on the Districts law bill which is before the legislature. On March 7 the writer attended the public hearing on the bill before the legislative Agricultural Committee. The Committee acted favorably on the bill. On May 29 I attended another public hearing on the same bill before the House of Representative's Ways and Means Committee. This Committee also acted favorably and the House of Representatives passed the bill on June 12. At present the bill is before the Senate. It is believed that it will pass this branch of the legislature. If and when the bill is passed by the legislature and is signed by the Governor, Massachusetts will have the unique distinction of being not the first but the last State to pass a District enabling act."

Supplemental Studies of Mulch and Row Grade - T. L. Copley of Raleigh, North Carolina.-"Eight 1/20 acre plots were laid out in the lower corn strip in the triangle field and four duplicate rates of lespedeza hay applied as mulch. These plots were established to serve as observational supplements to the regular stubble mulch studies. The primary purpose being to determine the minimum rate of applied mulch necessary to carry soil conservation benefits through the summer months."

"The site was prepared by disking and smoothing for supplementary row grade tests in conjunction with the row grade experiment. Furrows were opened with a stonewall cotton sweep on grades ranging from 6" to 48" per 100 feet. The grades increased from row to row by 6" or 1/2 per cent. The water supply is pumped from a nearby stream and provides a constant flow at any desired rate. Additional details of this test will be given in a later report."

Length and Per Cent Slope Study - C. A. Van Doren of Urbana, Illinois. - "Plots 35, 70, 140, and 210 feet in length are duplicated on 5 and 9 per cent slopes. Soil and water losses are measured during production of corn, winter wheat, and lespedeza in a three-year rotation.

"Limestone (3-1/2 tons an acre) and superphosphate 32 per cent (300 pounds an acre) were applied in the fall of 1936 or spring of 1937. All crops are seeded on the contour to lessen soil and water losses.

"Average annual soil losses in tons per acre from corn, wheat, and lespedeza rotation
Dixon Springs Experiment Station
1939-1943

Crop <u>1/</u>	Length of plots			
	35 feet	70 feet	140 feet	210 feet
		<u>5 per cent slope</u>		
Corn.....	3.7	5.5	6.8	5.1
Wheat.....	6.5	11.3	15.1	11.7
Lepedeza.....	2.8	2.9	3.4	2.0
Average annual soil loss.....	4.3	6.6	8.4	6.3
		<u>9 per cent slope</u>		
Corn.....	10.4	15.6	18.4	22.0
Wheat.....	7.2	10.6	15.1	15.1
Lepedeza.....	4.4	2.8	3.5	2.8
Average annual soil loss.....	7.4	9.7	12.3	13.3

1/ Figures for corn and wheat are average values of two crops: corn - 5 months; wheat - 7 months; and lespedeza - 2 years.

"Soil losses from plots producing corn on 9 per cent slopes were about three times as much as from 5 per cent slopes. Increasing the steepness of slope did not increase soil losses during production of winter wheat and lespedeza. In general, soil losses increased as the length of plot increased which emphasizes the importance of reducing slope length through contour farming, strip cropping, and terracing.

"Soil losses while wheat was being produced was higher than anticipated. Soil moisture at the time of wheat seeding is frequently low resulting in a delayed germination, slow growth of plants, and ineffective cover for erosion control.

"Only seven crops of corn would remove an inch of soil at the rate of loss measured from the 9 per cent slopes with plots 210 feet in length.

"Effect of length and per cent of slope on loss of soil
per bushel of corn produced,
two years - 1939, 1942

Length of plot	Soil per bushel of corn ^{1/}	
	5 per cent slopes	9 per cent slopes
Feet	Pounds	Pounds
35	160	346
70	255	535
140	280	660
210	195	738
Average	223	570

^{1/} Corn yielded 46.7 bushels per acre on 5 per cent slopes and 59.1 bushels per acre on 9 per cent slopes.

"Soil losses from all plots on both 5 and 9 per cent slopes have been too great to farm the land in a three-year rotation of corn, winter wheat, and lespedeza. Annual soil losses should be reduced in the area to about 2 tons per acre per year. The probable soil losses from various rotations are shown in the following table as an indication of the length of rotation required to satisfactorily control erosion on the steeper slopes in the area. Conservation practices as contour farming, strip cropping, or terracing should be used on the long slopes.

"Estimated annual soil losses from various rotations
(Based on losses from C, W, L rotation)

Rotation 1/	Per cent slope	Length of plot		
		70 feet	140 feet	210 feet
		<u>T/A</u>	<u>T/A</u>	<u>T/A</u>
C, W, L.....	5	6.6	8.4	6.3
C, W, M (8).....	5	2.0	2.6	2.0
W, M (6).....	5	2.1	2.7	2.0
C, W, L.....	9	9.7	12.3	13.3
C, W, M (4).....	9	4.9	6.2	6.7
C, W, M (13).....	9	2.0	2.6	2.7
W, M (6).....	9	2.0	2.7	2.6

1/ C = corn; W = winter wheat; L = annual lespedeza; M = grass and legume hay or pasture. Figures in parenthesis indicate number of years that meadow is to remain on the land."

New Wheat Variety Used as Test Crop - Ralph A. Cline of Bozeman, Montana.-"A new variety of spring wheat, 'Newthatch,' is being used as the test crop at this location this year. All the wheat emerged in excellent shape and the stands appear very uniform. Grain seeded on stubble mulch fallow was the slowest to emerge. This may be attributed to a seedbed that failed to warm up as rapidly as 'black top' fallow.

"Conditions this spring have been unusually favorable for the development and growth of weeds. While the weeds have thrived under existing conditions the grain has just been 'marking time.' It is anticipated that the grain fields in this area may be unusually weedy this year.

"The initial summer fallow tillage operations were completed this month. On stubble mulch fallow the treader (rotary hoe in reverse) was used in tandem with the subsurface tillage implements. This is the first year that this combination of tillage implements has been used and it is the first time that a 100 per cent volunteer wheat and weed kill has been secured at this location."

Effect of Manure and Strip Cropping on Soil and Water Losses - Orville E. Hays of LaCrosse, Wisconsin.-"A total of 7.98 inches of rain fell during the month in 9 storms. Seven of these storms caused runoff from the watersheds and control plots. These rains caused an excess of precipitation of 4.26 inches for the month of May over the 71-year average for the LaCrosse area. The total excess for the year being 7.47 inches over the same average as of June 1. The intensity of these rains was not great, the highest being 2.64 inches per hour for a 5-minute period on May 20. However, the rapid succession of storms, six occurring from May 20 to June 1, caused a large runoff and soil loss especially from the watersheds, terraces and control plots seeded to spring grain.

"Of special interest is the comparison of winter grain and spring grain from the control plot data for the largest of these rains.

Date	Thirty-minute intensities	Total rainfall	Winter grain, Control Plot No. 15		Spring grain, Control Plot No. 16		Corn (after 3 years of alfalfa-brome), Control Plot No. 17	
			Runoff, inches	Soil loss, T/A	Runoff, inches	Soil loss, T/A	Runoff, inches	Soil loss, T/A
May 20 to May 22	1.20	3.87	.21	.14	1.40	24.05	.06	.41

"The application of 5 tons as a top dressing after spring grain was seeded proved effective in reducing both runoff and soil loss.

Date	Amount of rainfall	Thirty minute intensities	Plot No. 13, top dressing with manure		Plot No. 14, no manure		Winter grain Plot No. 15, no manure		Plot No. 16, top dressing with manure	
			Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A
5/21-22	2.88	1.20	1.39	22.2	2.23	58.6	1.55	44.6	1.26	13.01
5/24-25	.97	.32	.36	1.8	.65	5.8	.42	3.8	.24	.92
5/27	.55	.24	.08	.18	.13	.63	.11	.53	.04	.06
5/31-6/1	.62	.32	.22	.47	.23	1.70	.22	1.39	.20	.21
6/1	.35	.60	.18	.68	.23	1.73	.22	1.54	.14	.42
TOTAL	5.37		2.23	25.33	3.47	68.46	2.52	51.86	1.88	14.62

AVERAGE -

	Runoff, inches	Soil loss, T/A
With manure.....	2.06	19.98
Without manure..	3.00	60.16

"The effect of manure as a top dressing reduced runoff by one-third and soil loss by two-thirds.

"Runoff and soil loss for the watersheds and terraces are given in the following table. Terrace A-4 and the unterraced watershed are seeded to oats in a 6-year rotation of corn, grain, 4 years of alfalfa meadow. The control watershed is seeded to oats in alternate 50 foot strips with 50 feet meadow strips between. The lower strip is in oats.

Date	Amount rain- fall	Thirty minute inten- sities	A-4 terrace		Unterraced watershed		Control strip- cropped watershed		Pasture watershed	
			Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A	Runoff inches	Soil loss, T/A
5/11	.79	.24	.008	-	-	-	-	-	-	-
5/20-21	1.18	.76	.236	1.0	.179	6.76	.047	.64	-	-
5/21-22	2.67	1.20	1.872	8.66	1.642	34.71	.828	6.44	.384	-
5/24-25	1.10	.32	.457	.74	.347	2.22	.064	.20	.001	-
5/27	.62	.24	.155	.15	.131	.36	.016	.03	-	-
5/31	.45	.28	.117	.05	.090	.18	.014	.01	-	-
5/31-6/1	.64	.32	.308	.23	.266	.89	.040	.05	-	-
6/1	.36	.60	.210	.32	.185	1.13	.035	.08	.002	-
TOTAL	7.81		3.363	11.15	2.840	46.25	1.044	7.45	.387	
Per cent runoff			43.06		36.36		13.37		4.96	

"The effect of alternate strips of meadow on the strip-cropped watershed in reducing the runoff and particularly the soil loss below that of the terrace watershed is of interest. Although the length of slope on the terrace watershed is not much greater than the width of the bottom grain strip on the strip-cropped watershed, in the case of the terrace watershed the entire acreage is in grain whereas in the strip-cropped watershed only approximately one-half the area is in grain. The strip cropping experiment at the Hundt Farm indicates that the soil loss from the lower strip may be as much as 80 per cent of the total lost from a strip-cropped watershed. Under these conditions the soil loss from the lower strip would be 43.5 tons per acre.

"Apparently the rains of May 20 to 22 were at the most critical time for spring planted grains this year. The soil had been settled by earlier rains, and the unfavorable growing conditions this spring had not allowed spring grain to make sufficient growth to afford protection to the soil."

Comparison Between Abruzzi and Rosen Varieties of Rye - John T. Bregger of Clemson, South Carolina. - "Comparison between Abruzzi and Rosen varieties of rye were made this year as orchard cover crops. The former variety matured much earlier than the latter and was almost completely checked in growth by the first mowing. The Rosen rye, on the other hand, made a second growth (which was almost equivalent to the first growth) following the first mowing, and did not completely reach maturity until several weeks later. Where tree competition is to be avoided, the Abruzzi variety is probably preferable as it is much easier checked."

Vetch-Rye Winter Cover - J. M. Aikman of Ames, Iowa. - "A vetch-rye winter cover seeded in contoured corn gave very satisfactory yields in dry-weight and nitrogen per acre. The two small experimental corn fields in which the mixture was planted each produced about 60 bushels of corn per acre. The mixture was planted on September 1, 1944 between the corn rows with a one-horse drill at the rate of 60 pounds of rye and 10 pounds of hairy vetch per acre. The pure vetch seeding on soil comparable in fertility to the other two fields was drilled at the rate of 20 pounds per acre. Growth yields of the winter covers were taken on April 26, 1945 from adequate samples of 1/16000 acre quadrats. The table shows the average yield of dry matter and of nitrogen per acre in the winter covers.

Date 1945	Winter cover	Location	Yield		
			Pounds per acre, dry matter	Per cent nitrogen	Nitrogen per acre
4/26	Vetch alone (double rate)	Hilltop, Lindley loam, two inches top soil			
	Tops.....		6,044	3.63	219.4
	Roots, 0-3 ins..		2,530	1.81	45.8
	Total.....		8,574		265.2
4/26	Vetch and rye				
	Vetch tops.....	Lower slope, Lindley loam, five inch top soil	1,635	3.6*	58.9
	Rye tops.....		2,812	3.8*	106.9
	Vetch and rye roots, 0-3 in.		4,503	2.4*	108.1
	Total.....		8,950		273.9
4/26	Vetch and rye				
	Vetch tops.....	Upper floodplain, Plainfield fine sandy loam	1,374	3.61	49.6
	Rye tops.....		5,336	3.85	205.4
	Vetch and rye roots, 0-3 inches**.....		4,909	2.42	118.8
	Total.....		11,619		373.8

* Estimated but not determined.

** Measurements were also taken in this field on roots at 3-6 inches in depth. These measurements yielded 1,480 pounds dry matter, an estimated 2.4 per cent nitrogen, and 35.5 nitrogen per acre."

Sweet Clover Plants on the Subsoil Shattering Experiment - D. D. Smith of Columbia, Missouri.-"Sweet clover plants on the subsoil shattering experiment plots were dug out and photographed again. Both top and root growth was superior on the shattered and treated plots as before, but the shattered plots without the treatment showed an inferior top growth and about the same root development as the check plots."

Winter Cover Crop of Vetch at the Guthrie Station - Harley A. Daniel of Guthrie, Oklahoma.-"Although May was unusually dry, an early winter cover crop of vetch was produced at the Guthrie Station. Where 250 pounds of superphosphate per acre was applied on poor, eroded land, an average of 10,183 pounds of green plants or 2,063 pounds of dry weight per acre was produced. Vetch and other winter cover crops, if properly managed, are very effective for erosion control because they grow in the spring at a time when the major portion of the runoff occurs."

Rotary Subsoiler Test - Hugh C. McKay of St. Anthony, Idaho.-"A trial of the K and S rotary subsoiler was made by a local farmer last fall on both stubble ground and fallow seeded to winter wheat. Upon inspecting the fields this spring it was found that it had proved beneficial on stubble land but its value on fall planted wheat was doubtful. The subsoiler left holes 12 inches deep and about 6 inches wide at the top. The 80 acres of stubble land done with the rotary subsoiler consisted of a small watershed and normally had considerable runoff and erosion occurring, even during stubble years. This spring there was no trace of runoff or any erosion, evidently all of the moisture had gone into the soil."

"On the fall seeded wheat there was a 30 per cent reduction in the stand of wheat. The subsoiler was not obtained soon enough last fall by the farmer for him to complete the operation before the fall wheat had gained a growth of from 3 to 4 inches. From the look of the field it was quite evident that if the rotary subsoiler is to be used on fall seeded wheat it should be used immediately after seeding, before the wheat has germinated."

Winter Cover Crops in Iowa - G. M. Browning of Ames, Iowa.-"Samples were taken from the cover crops of rye and vetch seeded in the fall of 1944. Yields range from .75 to 1.50 tons per acre, depending upon the date of seeding and method of handling the cover crop. On the outlying areas at different locations in the State, in most cases, the cover crops have been pastured heavily during the fall, winter and early spring and under these conditions spring growth is very limited."

Erosion and Artificial Lakes.-"Dr. Frank F. Riecker of the Iowa Agricultural Experiment Station and the Project Supervisor accompanied Messrs. G. L. Ziemer and W. W. Aitken of the State Conservation Commission, Mr. L. C. Crawford of the U. S. Geological Survey and Mr. G. H. Hershey, Assistant State Geologist, on a two-day trip through Western and Southwestern Iowa to observe sites that had been suggested for artificial lakes. Time was also spent at one area where a lake was constructed several years ago and has not proven satisfactory because of the muddy condition of the water. It appears difficulty is being encountered because of the failure to provide sufficient close-growing vegetation on the watersheds to the lake and also because of the out-cropping of glacial and gumbo tills on the water line in the lakes."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-Recent studies of our lysimeter data revealed some interesting comparisons as follows:

Year	Lysimeter No.	Cover	Precipitation	Runoff	Percolation
			Inches	Inches	Inches
1940	Y101	Grass	43	4	15
	Y102	Wheat	43	13	6
1941	Y101	Grass	41	1	12
	Y102	Corn	41	15	4

Note: Lysimeters Y101 and Y102 are on Muskingum silt loam, a well drained profile.

"In 1940, the total runoff from a mixed-cover watershed of 4,580 acres (26 percent woodland, 55 percent pasture and meadow, and 19 percent small grain and row crops) amounted to 19 inches - equal to the total surface runoff plus percolation of the lysimeters. Apparently, much of the water measured in the larger area for that year came from underground storage as the lysimeter and small watershed-runoff values are considerably less than 19 inches. Observations indicate that increases in the rate of percolation are reflected in stream flow rather soon - in some cases, on the same day as the storm. Inasmuch as the total water moved from the 4,580-acre watershed equaled the total lysimeter runoff plus percolation, it may be concluded that the water stored in the ground at the end of the year was about the same as at the start. In 1943 and 1944, noticeably dry years, there has been a general decline in groundwater stored and the stream-flow totals have exceeded lysimeter runoff plus percolation.

"These studies lead one to speculate over the possible effects of conservation practices on stream flow from large areas in this section of the United States. Soil-conservation practices may increase water intake into the soil, but this may be reflected in any one or, to some extent, in all the following disposal channels:

- (1) Increase evapo-transpiration
- (2) Increase in storage of soil and groundwater
- (3) Increase in stream flow

"Additional observations and further study will evaluate the magnitude of these processes."

Hydrologic Studies - R. B. Hickok, Lafayette, Indiana.-

"Rainfall totaled 4.78 inches on the Throckmorton farm and 4.98 inches on the Dairy farm, compared to the May 'normal' for the locality of 4.33 inches. Rain was recorded for 16 days out of the 31. Almost continuous rainfall from the 14-16, inclusive, averaging 3.23 inches in our gages for the 72 hour period, produced heavy runoff from our experiment watersheds and raised the Wabash River to flood stages.

"The following table summarizes runoff data from rotation crop watersheds for this three day period:

Runoff from Rotation Crop Watersheds, From Rainfall of 3.08",
May 14-16, 1945

Purdue Throckmorton Farm, Lafayette, Indiana

Crop	Treatment ^{1/}	Average Run-off ^{2/}		Mean Dev.
		Inches	% of Rain	% of Av.
Fallow ^{3/}	Prevailing	0.3366	10.9	76
	Conservation	0.0146	0.5	23
Wheat	Prevailing	0.9520	30.9	22
	Conservation	0.1424	4.6	45
	Mulch Tillage	0.0806	2.6	--
Meadow	Prevailing	0.4584	14.9	100
	Conservation	0.2201	7.1	100

^{1/} Corn, Wheat, Meadow rotation, 'square' tillage and seeding, common (light) fertilization on 'prevailing' practice watersheds; same rotation, contour seeding, heavy fertilization and manure plowed under for corn and top dressing on wheat on 'conservation' treated watersheds. Differential treatment, 1941-45.

Mulch tillage watershed (one only), includes meadow residue mulching of corn in 1944, other practices same as 'conservation' treated watersheds, 1944-45.

^{2/} Averages for 2 watersheds each, except single watershed in wheat following mulched corn (wheat top-dressed with manure).

^{3/} Old meadow, top-dressed with manure, spring plowed for corn and disced, uniform surface condition on prevailing and conservation treated watersheds.

"Runoff from wheat was reduced from 30.9 percent of the rainfall to 4.6 percent as a result of conservation practices. Although there was a high degree of variability within the group of fallow watersheds (plowed and disced for corn), the reduction runoff 10.9 percent of the rainfall to 0.5 percent is significant and can be attributed largely to effects of improved soil management practices beginning in 1941, as no effects of contour tillage existed at the time. The second highest total water loss 29.8 percent occurred from a meadow watershed under prevailing treatment. An adjacent physically similar conservation

treated meadow watershed lost but 14.3 percent. These watersheds have only moderately well drained soils. Meadow watersheds under each treatment having naturally well drained soils lost no runoff, indicating that the conservation treatment may be effective in reducing runoff from meadows on soils which become saturated.

"Mr. Bedell reports the following soil and fertility loss data:"

Soil and Fertility¹ Losses from Rotation Crop Watersheds, May, 1945
Purdue Throckmorton Farm, Lafayette, Ind.

Crop	Practice	Pounds per Acre ²				
		Total Solids	Organic Matter	Nitrogen	Avail. K ₂ O	Ca-Mg CO ₃
Wheat	Prevailing	153.0	9.21	0.55	0.53	5.33
	Conservation	8.0	0.86	0.06	0.10	1.04
	Mulched	3.0	0.43	0.03	0.04	0.47
Fallow ³	Prevailing	166.0	11.39	0.65	0.23	3.91
	Conservation	28.0	1.74	0.09	0.04	0.44
Meadow	Prevailing	10.0	2.04	0.11	0.20	3.25
	Conservation	5.5	1.26	0.07	0.02	1.95

¹Determinations of available phosphorous, pending availability of necessary apparatus (colorimeter) for proper precision (samples stored for future analysis).

²See foot-note No. 2 for table above.

³See foot-note No. 1 for table above.

³See foot-note No. 3 for table above.

Hydrologic Studies - R. G. White, East Lansing, Michigan.-

"As measured by the Standard Weather Bureau Non-recording Raingage, precipitation for the month of May measured 7.52 inches at the cultivated watersheds, 7.38 inches at the stubble-mulch plots, and 7.21 inches at the wooded watershed. The 40-year average precipitation for the month is 3.44 inches, as recorded by the United States Weather Bureau at East Lansing. According to the 82-year record of the East Lansing Weather Bureau, this was the wettest May ever recorded with the exception of 1943 when 7.98 inches of precipitation fell.

"On May 21, the soil moisture block at the 1-inch depth at station B was removed for examination. This block has been in operation since November 1943. The block was found to be in good physical condition, but had disintegrated 19 percent by weight and 17 percent by volume from its original size when installed. After the examination, the block was returned to its original field position."

Hydrologic Studies - John Lamb, Jr., Ithaca, New York. - "On May 10 an average of 6 inches of snow fell over the watersheds; its density was about 0.20, and with subsequent rise in temperature and an already wet soil, moderate but prolonged runoff occurred from all watersheds. Our peak runoff happened on May 17 with a rain of 1.28 inches in the open watershed and 1.53 inches in the woods. Runoff in percent of precipitation was 40.2 and 55.2, respectively.

"Precipitation of some sort was recorded during 15 days of May. Several high velocity wind storms caused local damage to trees and some farm buildings.

	April		May	
	Idle Land	Woodland	Idle Land	Woodland
Maximum temperature	83	87	81	82
Minimum temperature	23	23	28	29
Average maximum	58	60	58	60
Average minimum	37	37	39	37
Average mean	48	49	49	50
Precipitation, inches	2.52	2.52	5.83	6.74
Runoff, inches	0.86	1.05	2.69	3.24
Runoff, percent of precipitation	33.1	41.7	46.2	49.6

"While our watershed studies have not been in operation a sufficient length of time to form definite conclusions, there appears to be a seasonal trend for the 2-year period for 1942-43 and 1943-44."

Period		Idle Land in Weeds		Woodland	
		Precipitation	Runoff	Precipitation	Runoff
		Inches	% Precip.	Inches	% Precip.
Nov.-April	1942-43	18.93	52.0	19.73	60.4
	1943-44	12.26	49.3	12.26	55.2
May-Oct.	1943	21.68	18.4	21.96	19.5
	1944	21.13	18.6	22.81	16.7
Nov.-April	2-year avg.	15.60	50.7	16.00	57.8
May-Oct.	2-year avg.	21.41	18.5	22.39	18.1

Hydrologic Studies - H. A. Daniel, Cherokee, Oklahoma. - "Rainfall for the month was .54 of an inch. This was the lowest amount of rainfall received in May since this station was established. In addition, light frost occurred on May 17 and May 22, and this was the latest date that a frost has been recorded."

Microbiological Studies - F. L. Duley, Lincoln, Nebraska.-"In our microbiological studies, soil samples for nitrate determinations are being taken both at Hastings and Lincoln. In wheat the appearance of the plants indicates as much or more available nitrogen on mulched as on plowed land, although due to weather conditions applications of nitrogen fertilizers seems to be improving wheat under both conditions. The possibility of loss of nitrogen from surface mulches is being studied.

"Dr. Goodding is continuing his studies on CO₂ losses from residue on surface and worked into soil. He is preparing a paper for the Soil Science Meetings.

"Mr. Dawson's graduate supervisory committee met and approved, after some modification, his program for graduate courses and thesis."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-"The rainfall on the Bentonville, Arkansas, watersheds for the period January 1 to May 31 was 35.93 inches. This figure is the mean of 6 gages and is 81.5 percent of the 29-year average annual rainfall for Bentonville. During the month of May, the average rainfall on the watersheds was 5.37 inches. This is .29 inch greater than the 39-year average at Bentonville for that month. Even with the high amount of rainfall this section has experienced a drought of nearly 2 weeks and supplemental irrigation would have increased the yields of early maturing crops. The month of May has been a period with only small amounts of runoff from the watersheds located near Bentonville, Arkansas; Muskogee, Oklahoma; and Garland, Texas."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"Precipitation for the month of May at Edwardsville, Illinois, was 3.46 inches as compared with the normal of 4.4 inches. Total runoff for the month on the 50-acre-pasture watershed was .95 inch. Most of this runoff occurred on the 14th during an intense storm in which the following amounts of rainfall were recorded.

<u>Minutes</u>	<u>Inches</u>
5	.25
10	.35
15	.50
30	.75
60	1.06

"The peak rate of runoff for the storm was .5 inch per hour.

"Precipitation at Fennimore, Wisconsin, was 5.91 inches for the month compared with the normal of 4.0 inches. About 1/2 inch of this precipitation was in the form of snow on May 2 and 9. Intensities were generally moderate, and there was very little runoff. Temperatures, in general, were below normal and the corn planting has been considerably delayed by cold and wet weather."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"Compilation of the Blacksburg watershed records is nearing completion. Casual study of these records shows a significant reduction of water losses under strip-cropping practices; more thorough analysis now underway will show more clearly these savings."

Runoff Studies - H. K. Rouse, Colorado Springs, Colorado.-"During May the work progressed sufficiently to permit the preparation of first draft maps indicating amounts of precipitation which will be equaled or exceeded during 80 percent of the time (4 years out of 5) in eastern Colorado and eastern New Mexico. Nine separate maps were prepared indicating probable precipitation during the first quarter, the individual months of April, May, June, July, August, and September, the fourth quarter and the entire year. These maps were prepared at the request of the Regional Division of Conservation Surveys for immediate use and are subject to revision. This work is being continued to include much of the southern high plains."

Runoff Studies - J. H. Dorroh, Jr., Albuquerque, New Mexico.-"For the second consecutive month no rainfall was recorded at the experimental watersheds near Safford, Arizona. At watershed W-I, the last precipitation period occurred on March 23 and inasmuch as no rain had fallen prior to the date of this report the duration of the drought had extended to 84 days. At the watersheds near Albuquerque, New Mexico, similar conditions existed inasmuch as no precipitation was recorded during May and the April totals were considerably below normal. The last measurable rainfall occurred on April 23. Although precipitation was recorded at the Santa Fe, New Mexico, watersheds the totals were subnormal and resulted in still further reduction in comparative accumulations for the year.

"Such conditions are not considered particularly serious insofar as western New Mexico and southern Arizona are concerned inasmuch as even the normal rainfall during April and May is not sufficient to promote the growth of much vegetation. A similar situation however has prevailed in the greater part of eastern New Mexico where considerable dependence is placed upon spring rainfall to mature dry-land crops and provide feed and water for livestock. Although precipitation during the very early part of 1944 was generally normal to slightly above, conditions generally declined as the growing season progressed. At the end of May some localities in northern New Mexico had received enough moisture to be of benefit, yet for the entire East Side the February-May total averaged but 29 percent of the normal. The situation was particularly critical in southern New Mexico where no rainfall of significance occurred. The records from Roswell, Carlsbad, Artesia, Hobbs, and Portales are indicative of the drought's severity: For example, totals of 0.36 inch, 0.46 inch, 0.05 inch, 0.61 inch, and 1.00 inch of rainfall respectively. These amounts representing but 12, 19, 1.4, 22, and 28 percent of the normal."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"Mr. Anderson made 25 additional exploratory tests on the lucite pipe-bleeder model. This model has a riser 1.25 pipe diameters square and 5 pipe diameters deep. Although the water level in the riser fluctuated widely as the barrel alternately flowed full and partly full at certain average discharges, the level fluctuations did not affect the head on the crest of the riser. The rating curve of the weir crest, until the crest was flooded out, was found to be

$$1.64$$

$Q = 3.98LH$; where Q is the discharge in cubic feet per second, L the length of the weir crest in feet, and H the head on the crest in feet. This is practically the same as the equation obtained in previous tests and for rectangular spillways. It appears that very high vacuums can be expected at the top of the barrel where it joins the riser. These vacuums may cause cavitation in prototype structures. This point will receive additional study.

"A pump has been installed to permit Froude numbers of 50 to be obtained for the transition tests. The venturi meter was calibrated for higher flows and tests made at Froude numbers of 8 to 50. Apparently the 20:1 flare can be used up to a Froude number of 50. The instruments for solving transitions were rebuilt during the month because aging of the cellulose acetate plastic from which they were made had changed their dimensions considerably. The instructions for solving transition problems by the method of characteristics were rewritten. Experience in using the old instructions had shown them to be not clear in some places."

Hydraulic Studies - D. D. Smith, McCredie, Missouri.-"Calculation of channel test data from the V-shaped outlet is about completed.

"Amounts of runoff for different time periods have been determined from the runoff hydrographs of the bluegrass pasture watersheds records of the Bethany Station, and expected 2- and 5-year frequency runoff amounts determined. These records were used as a basis for determining storage volume and height for earth dams for different diameter drain pipes and for drainage areas from 1 to 80 acres. A technical paper is being prepared.

"Mr. Zingg has completed the evaluation of the effect of ponds on flood flows from the Bourbeause River. This work is to be supplemented with physical pond survey data gathered throughout the state by the Extension Service during May. Preliminary results of this survey indicate that 75 percent of the ponds in the State of Missouri are full to the spillway and that 1/2 of them are continuously discharging water through the spillway. Visible leaks through pond embankments were also observed on 40 percent of the ponds."

Hydraulic Studies - C. W. Lauritzen, Logan, Utah.-"Plans for the construction of a Hydraulic Laboratory to be used in connection with an investigation of canal lining and other hydraulic problems confronting irrigation have gone forward."

"The proposed construction will consist in the main of a Parshall flume in the Logan and Northern Irrigation Company canal, a headworks, pipe line, distribution tank, head channel, and 32 experimental canal sections each 20 feet in length. The linings will be constructed on top of a layer of graded gravel or a porous soil material and percolation intercepted by a concrete base from which it will be conveyed through a pipe line to a point of measurement."

"A field day was held at Benmore May 4 under the auspices of the Utah Agricultural Extension Service for the purpose of acquainting county agents and community leaders with the possibilities of reseeding abandoned farming areas and depleted range lands. The group was much impressed with the work which was in progress and many requests were received for information concerning the results being obtained. To satisfy this demand for information, a joint statement by the cooperating agencies of the methods used and the results obtained is being prepared for release under the direction of the Utah Agricultural Experiment Station."

Hydraulic Studies - A. W. Marsh, Corvallis, Oregon.-"In the second percolation trial, briefly mentioned last month, the sulfur treated soil showed the most rapid percolation for both series replacing gypsum, which occupied the No. 1 position for the first percolation. The treatments in decreasing order of percolation rates are sulfur, gypsum, sugar beet lime, calcium chloride, and check for both series with and without alfalfa. Analysis for exchangeable bases shows that the sulfur, which had not replaced so much sodium as the gypsum in 60 days, now at 120 days has replaced almost as much sodium as the gypsum has."

Hydraulic Studies - Vito A. Vanoni, California Institute of Technology, Pasadena, California.-"Tests of the existing spillway at Lake Carl Blackwell were completed and a preliminary report of the results were submitted. The studies show that the maximum flow that the structure can carry without overtopping the walls is 6,000 cfs. The flow conditions in the structure do not change appreciably when the elevation of the existing crest is raised 2 feet. The only difference in the behavior is that with the raised crest the hydraulic jump near the toe of the crest moves downstream a few feet."

"At the request of Mr. Karl Kohler, Regional Engineer, Region 7, a very brief study was undertaken to determine the apron length for an irrigation drop with rather unusual operating requirements. The structure was designed to discharge 250 cfs, had a total drop of 3 feet, and tailwater elevations ranging as high as 4-1/2 feet above the top of the end sill, or 1-1/2 feet above the crest. The notch of the crest

and the apron were trapezoids with 9 feet bottom widths and side slopes of 1-1/2 to 1. The question was how long to make the apron to get satisfactory performance of the drop with this unusually high tailwater. Experiments showed that satisfactory performance could be obtained if the apron length was increased about 50 percent over that given by the standard formulas for the gully drop developed at this laboratory. The standard formula gave a length of 10.4 feet, while the studies made showed that a length of 15 feet would be adequate. When the standard length was used in the model studies, excessive erosion occurred."

Sedimentation Studies - Carl B. Brown, Washington, D. C.-

"During the first part of the month I continued field inspections and preparation of plans for an investigation to determine rates of sediment production from mountain and foothill watersheds in the Central Valley area of California. This work was done as part of a project undertaken at the request of the United States Engineer Office, Sacramento, to develop data necessary in the design of flood-control and multiple-purpose reservoirs authorized to be constructed in this area. On May 17, Louis M. Glymph, Jr. reported at Sacramento to take charge of this work for the Soil Conservation Service.

"Ten days were spent in Pasadena and Los Angeles during which time the program and experiments of the Cooperative Laboratory, California Institute of Technology, were reviewed; plans were made for preparation of material for a text book for agricultural engineers; and conferences were held with engineers of the Los Angeles County Flood Control District, United States Engineer Office and the Forest Service Flood Control Survey Party on the Arroyo Seco project, to discuss sedimentation investigations of mutual interest. En route to Washington, three days were spent in Albuquerque, where sedimentation investigations in the Rio Grande Valley and other Southwestern drainage basins were discussed with engineers of the United States Engineer Office, Bureau of Reclamation, and Geological Survey. Two days were spent in Las Cruces assisting Messrs. Hubbell and Gardner in making certain revisions in their final report on the experiments at the Navajo Experiment Station, New Gallup, New Mexico.

"An article by the writer entitled 'Protecting Municipal Watersheds in Southeastern States' was published in the May issue of Public Works.

"On May 3, Messrs. Gottschalk and Detwiler met with Operations officials at Baltimore, Maryland, to work out plans for cooperating with the Baltimore Bureau of Water Supply in a program of sediment control in Paper Mill Pool at the upper end of Loch Raven Reservoir. A subsequent conference with engineers of the Bureau of Water Supply resulted in agreement on the plan, which provides for cooperation between the Bureau, the Gunpowder Falls Soil Conservation District, and the Soil Conservation Service. A program of vegetal plantings on the silt bars in this pool plus channel diversions will be used to develop the pool into a silting basin, which will keep substantial quantities of sediment from reaching the main storage area of the reservoir. A detailed

survey of this pool will be made cooperatively by the Bureau and Soil Conservation Service as a basis for making periodic checks on the effectiveness of the control measures. Analysis of resulting data will be undertaken by this office. The results will provide useful information on the efficiency of vegetal screens as a method of reservoir-silting control."

Sediment Studies - Vito A. Vanoni, Cooperative Laboratory, California Institute of Technology, Pasadena, California.--"Analysis of sediment-transportation data obtained from experiments in the 10-inch flume showed that the measured rates of transportation were much higher than given by the theory of bed-load movement developed by Dr. H. A. Einstein. These measurements are made in the range of high rates of sediment transportation where the theory has not yet been verified. It is thought that the higher transportation rates shown by the experiments is probably due to bed material moving in suspension.

"Some progress was made on analysis of suspended load data to be included in the author's closing discussion of the paper on transportation of suspended sediment by water which appeared in the June, 1944 issue of the Proceedings of the American Society of Civil Engineers.

"A demonstration experiment was developed showing simultaneously the action of the flow on a model revetment made up of a single screen and other types of revetment. This comparison is accomplished by using a single screen on one bank of the model stream and other types on the other bank. The next step in this study is to visit actual field installations of revetments with a view to analyzing their behavior and history. In this manner it should be possible to learn more about the action of revetments and to evaluate the important features of various types of revetments used.

"A manuscript by Hans Albert Einstein entitled, 'Infiltration and Surface Runoff' was approved for publication. This paper will appear in the next issue of the Transactions of the American Geophysical Union."

Drainage Studies - B. S. Clayton, The Everglades Experiment Station, Belle Glade, Florida.--"During the month of May groundwater wells were established along 4 lines in the Caloosahatchee valley. These locations were 1/2 mile east of Ortoona Locks; 1/2 mile west of Ortoona Locks; a line across the valley at La Belle; and a line across the valley at Denaud. The total length of the 4 lines is about 7.5 miles and the number of wells was 32 in all.

"Profile levels were run over all the lines and reference points left on each well. The wells consisted of 1-1/2 inch galvanized pipes from 7 to 14 feet in length. These were installed with the use of an air compressor where needed to penetrate hard material.

"The lines are read once a week by Mr. Close, the Soil Conservation Service Work Unit Conservationist at La Belle, and results have been plotted up at this office. All profiles and water levels are on mean sea level datum.

"The object of this study is to determine the effect of raising the water level in the Caloosahatchee river, between Ortoona and Alva, on the water tables in the agricultural lands both north and south of the river. The new channel recently completed through the Caloosahatchee valley has reduced the possibilities of flood damage, but has also reduced the water tables during dry periods in the adjacent lands. Some of the land owners believe that a lock above Alva would be of much value in maintaining higher water tables during the dry portion of the year.

"It is interesting to note that the rain gage located at the Yacht Club in Fort Lauderdale records an increasing deficiency in rainfall since 1941. The rainfall in 1941 was 55.01 - a deficiency of 10.18, and for succeeding years was -

1942	"	53.05	- "	"	"	12.14
1943	"	47.38	- "	"	"	17.81
1944	"	41.61	- "	"	"	23.58

and through March 31st of this year the deficiency is 3.34."

Drainage Studies - C. Kay Davis, The Everglades Project, Fort Lauderdale, Florida.-"We have completed the topographic survey north of the Palm Beach Canal and south of the Seaboard Airline Railway.

"Recordings were made from the 6 aerial gages during the month of May. Because of intense fires and smoke over the entire Everglades it was not possible to accurately record the water level at the aerial gages. The recordings that we did make, however, were the lowest that we ever recorded. The water level in the Everglades is now probably at an all-time low. The wells are again dry even though they were cleaned out to rock in April. The water table is at least 4-1/2 feet below land surface in the area between the North New River, Miami, and Hillsboro canals. A recording gage on line D (which is about 2 miles west of 15-Mile Dike) recorded the water table at 3.44 m.s.l."

Drainage Studies - R. E. Morris, North Liberty, Indiana.-"The total rainfall for the month of May was 5.2 inches and the weather in general was cold and damp.

"The required water levels were maintained in the plots as nearly as possible. Because of the rains the 45-inch plots are not yet down to 45 inches, but they are going down steadily at present. In order to facilitate planting it was necessary to lower the water levels in the 15-inch plots to approximately 24 inches. While the levels were at 15 inches, the plots would not dry out enough between rains to allow the crops to be put in.

"During one week all of the streams in this area were at flood stage and had it not been for the Menge pump this project would have been completely under water. Practically all of the neighboring muck areas were flooded.

"Mr. Mayer brought a fresno from Lafayette, and it was used in leveling spoil banks and filling low spots in the alley ways. Several days were spent in reinforcing certain timber headwalls which were bulging badly. The reinforcing procedure was to bury a 'dead man' at an appropriate distance behind the headwall in question and then to pull it back into place by means of turnbuckle and cable."

IRRIGATION DIVISION

Efficiency of Irrigation Methods for Different Problem Areas -

Altus Area, Oklahoma.-Harry F. Blaney completed a preliminary report on irrigation in this area. The report includes a description of the Altus Project; a summary of results of irrigation studies in Wichita Valley, Texas; an estimate of water and irrigation requirements for alfalfa, cotton, and sorghum at Altus; and an outline of proposed irrigation efficiency and soil-moisture-control program. The average annual precipitation at Altus is about 26.5 inches of which 20.6 inches occurs during the irrigation season (April to October inclusive). It was estimated that under good irrigation practice the irrigation requirements would be 26 inches for alfalfa, 12 inches for cotton, and 15 inches for sorghum in years of normal rainfall.

Antelope Valley California.-The decline of water levels in irrigation wells in Antelope Valley has become so serious that it may not be profitable to irrigate alfalfa in the postwar period owing to the increased pumping lift, unless the efficiency of irrigation is increased. Harry F. Blaney reports that the Office of Operations has started efficiency of irrigation and soil-moisture studies in the Antelope Valley Soil Conservation District in cooperation with the Division of Irrigation.

Evaporation and Transpiration Losses Affecting Irrigation Practices -

Pahranagat Valley, Nevada.-At the request of the Portland Regional Office, Mr. Blaney made an estimate of monthly consumptive use and irrigation requirements for Pahranagat Valley. In normal years, for the period April 1 to October 15, it was estimated that the consumptive use by alfalfa would be 34 inches and that 47 inches of irrigation water would be required with farm-irrigation efficiency of 65 percent.

Snow Surveys and Irrigation Water Supply Forecasts - Sno-Cat Tests.-

Mr. Work reports that further tests of the Sno-Cat were made. The particular machine on loan to us at Medford, without obligation, has traveled 316 miles over the snow in the past 6 weeks. Total expense for gasoline, oil, and repairs has been about \$6.30. On this most recent test the machine, carrying 6 passengers, ascended Garfield slide in Crater Lake Park. This grade is one of gradually increasing pitch. When the machine finally stalled and started to dig itself into the snow, the grade of ascent was 58 percent. The machine both ascended and descended the novice ski trail and several of the steep ski hills near Crater Lake Rim. The tests have shown the need for a few minor corrections but Mr. Work is satisfied that the machine will prove to be a dependable and speedy means of transportation over snow.

Storage of Water Underground for Irrigation - San Joaquin Valley

Joint Investigations.-Dean C. Muckel reports that a drying period is being tried on some of the percolation ponds and a program of sampling for soil-moisture determinations is being developed. It has been found that a recovery in rate occurs when the soil is dried to the wilting point. Heretofore there has been nothing definite on just how dry some of the ponds have become during the drying period.

An area of approximately 100 acres recently developed by the Kern County Land Company for spreading purposes was inspected. The dikes constructed on the contour were made with a motor grader and several failures resulted shortly after water was turned into the checks. The dikes are to be strengthened and more land developed for spreading purposes. Percolation rates obtained on this area will provide a means of determining whether the rates as observed on small test ponds might be used for large areas. Another small plot which has been worked with a "gopher" plow was inspected. With this plow, holes about 6 inches in diameter have been made running the long way of the plot about 30 inches below the ground surface. The holes are spaced laterally 3-1/2 feet apart. One of the ideas back of this trial was to determine if the percolation rates decrease as with surface spreading. If this type of spreading is successful, the land surface can be cropped with a shallow-rooted crop at the same time spreading is done.

Control of Silting in Irrigation and Drainage Systems - Imperial Valley Drainage Investigation, California.-W. W. Fox reports that irrigation of the Dorman alfalfa plot took place on May 1 and May 15, with water applied to the center land at the rates of 3.35 and 3.54 inches. On the adjacent check plot irrigated by the farmer, the water table is maintaining a position from 1.0 to 1.5 feet higher than on the study plot. Preliminary indications are that yields from the study plot will be greater than from the check plot. For the period October 27, 1944 to May 3, 1945, the following tentative values were calculated:

Consumptive use - - - - -	15.06 ins.
Water applied, calculated from soil samples - - -	18.10 ins.
Water applied, as measured with Parshall flume ---	20.52 ins.

A new well was installed for observing daily fluctuations of the water table. It is a gravel-envelope installation with a 4-inch perforated steel casing. Records are obtained with a Friez Model FW-1 water-stage recorder.

In the tile-drain study tank, Experiment No. 10 was conducted, starting with the water table at equilibrium at a depth of 45 cm. below the sand surface so that the capillary fringe would not be truncated. No better results were obtained than in previous experiments.

Trail Run No. 7 is being made in the model-sump tank using a bedding material with approximately 48 percent very fine sand, 42 percent silt and 10 percent clay. The filter material is pit run and has about 50 percent 10-20 mesh particles. In the initial low head runs the filter is satisfactory and is giving the greatest flows yet obtained.

Customs, Regulations, and Laws Affecting Farm Irrigation and Drainage - Hawaii Water-law Studies.-Wells A. Hutchins reports that the bill for control of ground water of the Island of Oahu, based upon public ownership, which was prepared under the cooperative agreement with the Honolulu Board of Water Supply, was introduced in the 1945 legislature at the request of Governor Stainback of Hawaii, who sent a special message to both houses of the legislature recommending its favorable consideration. The bill was considered by the committees of the House of Representatives, and at the close of the session it was referred to the Holdover Committee for future action.

The bill contains the essential elements of the appropriation doctrine, which is the exclusive doctrine with respect to surface streams in some Western States and is concurrent with the riparian doctrine in others, and applies to ground waters in several States. However, the appropriation doctrine, which implies public ownership of waters to which private rights of use may be acquired, has never been a part of the water law of Hawaii; on the contrary, ex- tant decisions of the Hawaii Supreme Court on ground waters are in conflict with that principle. Hence, as anticipated, considerable opposition to the public-ownership principle developed. Mr. Frederick Ohrt, Manager of the Board of Water Supply, wrote under date of May 9 that legislators and others generally agreed on the need for control of ground water, "although some dis- agree with the principles involved in this proposed statute. Some feel it re- sults in the Government taking over private property rights without proper recompense for such rights. Almost everybody, however, agrees that the proposed statute is well written and prepared."

Bitterroot Valley, Montana.--J. S. James comments on his recent conferences with representatives of Federal agencies and of the Bitterroot Soil Conserva- tion District, which have emphasized the need for clearer understanding of the legal and organizational factors affecting the use of water in such areas as the Bitterroot Valley. These factors include the established customs and practices in the administrations of decreed water rights. As a basis for planning projects or other measures for improving water service, study is needed of forms and methods of organization to effect better distribution of present supplies and equitable assessment of costs of supplemental water supplies.

7/18/45

